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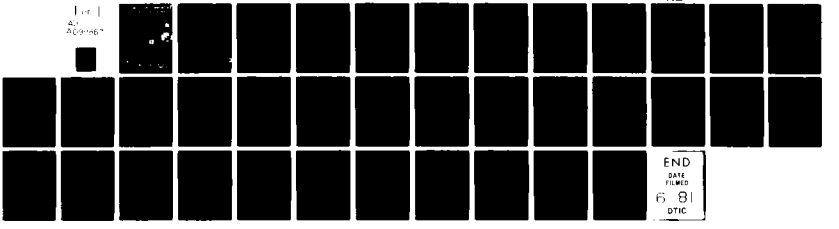
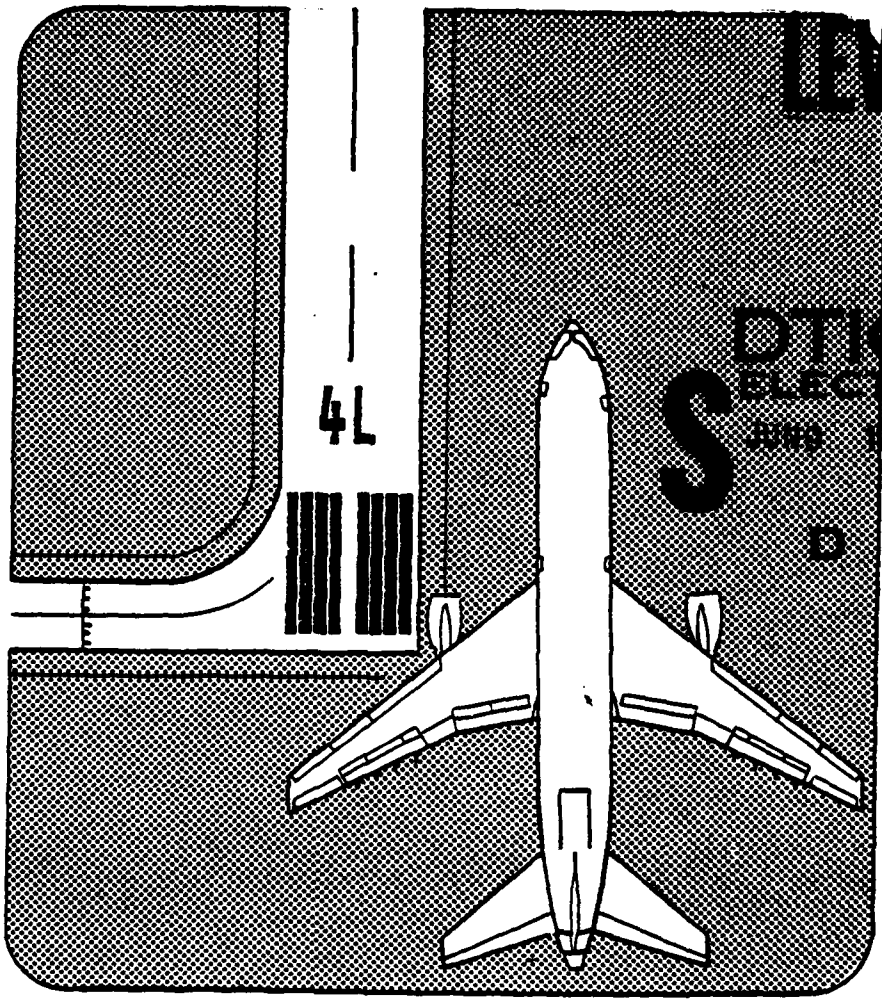


NEW YORK AIRPORTS

DATA PACKAGE NO. 4

JOHN F. KENNEDY INTERNATIONAL AIRPORT, LA GUARDIA AIRPORT.

AIRPORT IMPROVEMENT TASK FORCE DELAY STUDIES.



prepared for
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
under contract
DOT-FA77WA-3961

PMM&Co. Peat, Marwick, Mitchell & Co.

DEC[redacted]78

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SAN FRANCISCO, CALIFORNIA 94128

Telephone: (415) 347-9521

December 11, 1978

Mr. Ray H. Fowler, AEM-100
Federal Aviation Administration
800 Independence Avenue, S.W.
Washington, D.C. 20591

Re: New York Data Package No. 4, December 1978

Dear Ray:

Enclosed is New York Data Package No. 4. Attachment A of the Data Package contains revised experiment summary sheets and a revised summary table of results for John F. Kennedy International Airport. Attachment B contains revised results for LaGuardia Airport.

Attachment C contains a tentative list of Stage 2 experiments for each of the airports. These were defined at the Task Force subgroup meeting on October 27, 1978.

This information should be reviewed by members of the New York Task Force at their 14 December 1978, meeting.

Sincerely,

Stephen L. M. Hockaday
Manager

SLMH/sls
Enclosure

cc: Mr. J. R. Dupree (ALG-312)
Mr. C. Caiafa (AEA-4)

AIRPORT IMPROVEMENT TASK FORCE DELAY STUDIES

New York Task Force
Data Package No. 4

TABLE OF CONTENTS

Attachment A

STAGE 1 AIRFIELD SIMULATION RESULTS

John F. Kennedy International Airport

New York
Airport Improvement Task Force Delay Studies

Peat, Marwick, Mitchell & Co.
San Francisco, California

December 1978

Table A-1

NEW YORK TASK FORCE DELAY STUDIES
John F. Kennedy International Airport
Summary Results of Stage-1 Experiments (Revised)
Airfield Simulation Model Runs

Experiment No.	Runways Used		Time Frame	Weather Conditions	Average Flow Rates-ac/hr				Average Runway Delays-min				Average Taxiing Delays-min		Major Comparison Cases
					Arrivals		Departures		Arrival Air		Departures		Taxi-In	Taxi-Out	
	Arrivals	Departures			Peak[a]	Average[b]	Peak	Average	Peak	Average	Peak	Average	Peak[a]	Peak[a]	
1	13R, 22L, 22R	22R	1977	VFR1	33	31.8	43	30.6	0.7	0.8	11.6	5.5	0.6	0.6	Baseline, 2
2	22L	22R	1977	IFR1	26	25.9	38	27.1	112.1	83.0	7.4	3.1	0.3	0.2	Baseline, 1, 2A, 19
2A	22L	22R	1977	IFR1	26	26.1	38	27.3	113.5	84.0	7.3	3.1	0.3	0.2	2, 19
19	22L	22R	1977	IFR1	26	26.1	38	27.3	111.5	82.9	7.4	3.2	0.2	0.2	2, 2A
3	4L, 4R	4L	1977	VFR1	32	31.8	32	27.9	1.0[c]	1.3[c]	33.8[c]	9.6[c]	7.7	0.7	Baseline, 4
4	4R	4L	1977	IFR1	24	24.3	38	26.9	120.3	91.2	8.2	3.5	0.2	0.2	Baseline, 3
18	4L, 4R	4L	1977	IFR1	35	31.8	24	24.8	50.3	32.4	32.1[d]	37.8	7.2	0.7	4
5	31L, 31R	31L	1977	VFR1	33	31.8	36	30.8	1.5	1.5	17.8	10.1	0.0	0.3	Baseline, 16, 6
16	31L, 31R	31L, 31R	1977	VFR1	33	31.8	44	30.8	2.1	1.3	3.6	2.0	0.0	0.2	5
6	31R	31L	1977	IFR1	27	26.3	39	27.4	111.5	82.9	7.6	3.1	0.0	0.2	Baseline, 15, 5
15	31L, 31R	31L, 31R	1977	IFR1	33	31.9	45	30.9	3.0	2.8	5.9	2.8	0.0	0.1	6
7	13L, 13R	13R	1977	VFR1	33	31.8	37	31.0	1.6	1.6	16.0	9.7	0.2	0.3	Baseline, 8
8	13L	13R	1977	IFR1	26	26.1	39	27.6	111.5	83.4	7.4	2.5	0.1	0.2	Baseline, 7

a. For the peak-demand hour, 1900-2000 hours; five hours into the simulation.
b. Average over the simulation period.
c. These results represent a case where the "departure queue trigger-interarrival gap" does not space out arrivals to allow departures to get out; intentionally left in to show effect.
d. In Experiment 18, the only departure stream interacts with arrivals. This is the only case where this occurs in IFR1, which is why departure runway delays are so high.

JFK - STAGE 1

Experiment No. 1

Objective:

To obtain baseline delay estimates for the following runway configuration in VFR 1:

Arrival Runways	Departure Runways
13R, 22L, 22R	22R

Related Comparison Experiments:

Experiments 2, 2A, and 19 have similar runway-use configurations but different weather conditions, namely IFR1 instead of VFR 1.

Length and Level of Detail of Simulation Run:

From 1500 to 2300 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1900-2000 hours, and average values over the 8-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	31.8	33
Arrival	Air Delay	min.	0.8	0.7
Arrival	Taxi-In Delay	min.		0.6
Departure	Flow Rate	a/c per hr.	30.6	43
Departure	Runway Delay	min.	5.5	11.6
Departure	Taxi-Out Delay	min.		0.6

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

JFK - STAGE 1

Experiment No. 2

Objective:

To obtain baseline delay estimates for the following runway-use configuration in IFR1:

Arrival Runways	Departure Runways
22L	22R

Related Comparison Experiments:

Experiments 2A and 19 are for the same runway-use configuration and weather, but for different exit taxiway arrangements.

Length and Level of Detail of Simulation Run:

From 1500 to 2300 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1900-2000 hours, and average values over the 8-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	25.9	26
Arrival	Air Delay	min	83.0	112.1
Arrival	Taxi-In Delay	min		0.3
Departure	Flow Rate	a/c per hr.	27.1	38
Departure	Runway Delay	min	3.1	7.4
Departure	Taxi-Out Delay	min		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

JFK - STAGE 1

Experiment No. 2A

Objective:

To provide baseline comparison delay estimates for the situation where exit taxiway J from arrival Runway 22L is closed and aircraft that miss exit H must exit at the end of the runway.

Related Comparison Experiments:

Experiment 19 provides the case where a new exit (between J and H) is provided from Runway 22.

Length and Level of Detail of Simulation Run:

From 1500 to 2300 with 15-minute summaries.

Anticipated Results:

Slightly greater arrival delays than in Experiment 2.

Summary Comparison:

Operation Type	Performance Measure	Units	This Experiment		Experiment No. 2	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow Rate	a/c per hr.	26.1	26	25.9	26
Arrival	Air Delay	min.	84.0	113.5	83.0	112.1
Arrival	Taxi-In Delay	min.		0.3		0.3
Departure	Flow Rate	a/c per hr.	27.3	38	27.1	38
Departure	Runway Delay	min.	3.1	7.3	3.1	7.4
Departure	Taxi-Out Delay	min.		0.2		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

JFK - STAGE 1

Experiment No. 19

Objective:

To investigate potential benefits of adding an additional turnoff runway 22L between exits H and J.

Arrival Runways	Departure Runways
22L	22R

Related Comparison Experiments:

Experiments 2 and 2A.

Length and Level of Detail of Simulation Run:

From 1500 to 2300 with 15-minute summaries.

Anticipated Results:

Slightly lower arrival delays than Experiment No. 2. Lower arrival delays than Experiment 2A.

Summary Comparison:

Operation Type	Performance Measure	Units	This Experiment		Experiment No. 2	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow Rate	a/c per hr.	26.1	26	25.9	26
Arrival	Air Delay	min.	82.9	111.5	83.0	112.1
Arrival	Taxi-In Delay	min.		0.2		0.3
Departure	Flow Rate	a/c per hr.	27.3	38	27.1	38
Departure	Runway Delay	min.	3.2	7.4	3.1	7.4
Departure	Taxi-Out Delay	min.		0.2		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

JFK STAGE-1 EXPERIMENTS

Experiment No. 3

Objective:

To obtain baseline delay estimates in VFR1 conditions for the following runway-use configuration:

Arrival Runways	Departure Runways
4L, 4R	4L

Related Comparison Experiments:

Experiment 4 has the same basic runway-use configuration without arrivals on 4L, and Experiment 18 has the same configuration but with 2-mile staggered arrival separations on 4R and 4L.

Length and Level of Detail of Simulation Run:

From 1500 to 2300 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1900-2000 hours, and average values over the 8-hour simulation period.

Note: In this experiment, the "departure-queue trigger, interarrival gap" mechanism did not work. It was intentionally left that way to show sensitivity to this mechanism. Compare with results of Experiments 5 and 7.

Operation Type	Performance Measure	Units	This Experiment		Experiment No. 5	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow Rate	a/c per hr.	31.8	32	31.8	33
Arrival	Air Delay	min.	1.3	1.0	1.5	1.5
Arrival	Taxi-In Delay	min.		7.7		0.0
Departure	Flow Rate	a/c per hr.	27.9	32	30.8	36
Departure	Runway Delay	min.	9.8	33.8	10.1	17.8
Departure	Taxi-Out Delay	min.		0.7		0.3

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

JFK STAGE - 1 EXPERIMENTS

Experiment No. 4

Objective:

To obtain baseline capacity estimates in IFR1 conditions for the following runway-use configurations:

Arrival Runways	Departure Runways
4R	4L

Related Comparison Experiments:

Experiment 3, which is in VFR1, has same runway-use configurations with 4L also used for arrivals and Experiment 18 has similar configurations but with 2-mile staggered arrivals.

Length and Level of Detail of Simulation Run:

From 1500 to 2300 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1900-2000 hours, and average values over the 8-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	24.3	24
Arrival	Air Delay	min.	91.2	120.3
Arrival	Taxi-In Delay	min.		0.2
Departure	Flow Rate	a/c per hr.	26.9	38
Departure	Runway Delay	min.	3.5	8.2
Departure	Taxi-Out Delay	min.		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

JFK STAGE - 1 EXPERIMENTS

Experiment No. 18

Objective:

To provide estimates of the expected delay reduction associated with using 2-mile staggered separations on Runways 4L and 4R in less than visual conditions in periods of high arrival demand.

Related Comparison Experiments:

Experiment 3, a VFR1 experiment, has a similar runway configuration, but Experiment 4 provides a direct comparison for this experiment.

Length and Level of Detail of Simulation Run:

From 1500 to 2300 with 15-minute summaries.

Anticipated Results:

Greater arrival capacity and lower arrival delays than in Experiment 4.

Summary Comparison:

Operation Type	Performance Measure	Units	This Experiment		Experiment No. 4	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow Rate	a/c per hr.	31.8	35	24.3	24
Arrival	Air Delay	min.	32.4	50.3	91.2	120.3
Arrival	Taxi-In Delay	min.		7.2		0.2
Departure	Flow Rate	a/c per hr.	24.8	24	26.9	38
Departure	Runway Delay	min.	37.8	32.1	3.5	8.2
Departure	Taxi-Out Delay	min.		0.7		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

JFK STAGE - 1 EXPERIMENTS

Experiment No. 5

Objective:

To obtain baseline delay estimates in VFR1 for the following runway-use configuration:

Arrival Runways	Departure Runways
31L, 31R	31L

Related Comparison Experiments:

Experiment 16, also in VFR1, has same configuration but with short-range departures on 31R and independent departure tracks. Experiments 6 and 15 have the same basic runway-use configuration but in IFR1.

Length and Level of Detail of Simulation Run:

From 1500 to 2300 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1900-2000 hours, and average values over the 8-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	31.8	33
Arrival	Air Delay	min.	1.5	1.5
Arrival	Taxi-In Delay	min.		0.0
Departure	Flow Rate	a/c per hr.	30.8	36
Departure	Runway Delay	min.	10.1	17.8
Departure	Taxi-Out Delay	min.		0.3

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

JFK STAGE - 1 EXPERIMENTS

Experiment No. 16

Objective:

To investigate the potential benefits of independent departure tracks on runways 31L and 31R (31R used for short-range departures) in VFR1 conditions and the following runway-use configurations:

Arrival Runways	Departure Runways
31L, 31R	31L, 31R

Related Comparison Experiments:

The effect of the independent departures on 31L and 31R can be evaluated by comparing Experiment 16 with Experiment 5.

Length and Level of Detail of Simulation Run:

From 1500 to 2300 with 15-minute summaries.

Anticipated Results:

Lower departure runway delays and higher departure capacity than in Experiment 5.

Summary Comparison:

Operation Type	Performance Measure	Units	This Experiment		Experiment No.5	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow Rate	a/c per hr.	31.8	33	31.8	33
Arrival	Air Delay	min.	1.3	2.1	1.5	1.5
Arrival	Taxi-In Delay	min.		0.0		0.0
Departure	Flow Rate	a/c per hr.	30.8	44	30.8	36
Departure	Runway Delay	min.	2.0	3.6	10.1	17.8
Departure	Taxi-Out Delay	min.		0.2		0.3

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

JFK STAGE - 1 EXPERIMENTS

Experiment No. 6

Objective:

To provide baseline delay estimates in IFR1 conditions, for the following runway-use configurations:

Arrival Runways	Departure Runways
31R	31L

Related Comparison Experiments:

Experiment 15 will have the same basic runway-use configurations in IFR1 but with independent arrivals and independent departures on both R31R and R31L.

Length and Level of Detail of Simulation Run:

From 1500 to 2300 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1900-2000 hours, and average values over the 8-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	26.3	27
Arrival	Air Delay	min.	82.9	111.5
Arrival	Taxi-In Delay	min.		0.0
Departure	Flow Rate	a/c per hr.	27.4	39
Departure	Runway Delay	min.	3.1	7.6
Departure	Taxi-Out Delay	min.		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

JFK STAGE - 1 EXPERIMENTS

Experiment No. 15

Objective:

To investigate the potential delay savings associated with having independent arrivals, independent departures, and independent missed approach tracks on Runways 31R and 31L in IFR1 conditions.

Related Comparison Experiments:

Experiment 6 serves as the basis for evaluating the impact of the improvements in Experiment 15.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Anticipated Results:

Lower arrival and departure delays and greater capacities than in Experiment 6.

Summary Comparison:

Operation Type	Performance Measure	Units	This Experiment		Experiment No. 6	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow Rate	a/c per hr.	31.9	33	26.3	27
Arrival	Air Delay	min.	2.8	3.0	82.9	111.5
Arrival	Taxi-In Delay	min.		0.0		0.0
Departure	Flow Rate	a/c per hr.	30.9	45	27.4	39
Departure	Runway Delay	min.	2.8	5.9	3.1	7.6
Departure	Taxi-Out Delay	min.		0.1		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

JFK STAGE - 1 EXPERIMENTS

Experiment No. 7

Objective:

To obtain baseline delay estimates, in VFR1 conditions, for the following runway-use configuration:

Arrival Runway	Departure Runways
13L, 13R	13R

Related Comparison Experiments:

Experiment 8 has the same basic runway-use configuration in IFR1 conditions.

Length and Level of Detail of Simulation Run:

From 1500 to 2300 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1900-2000 hours, and average values over the 8-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	31.8	33
Arrival	Air Delay	min.	1.6	1.6
Arrival	Taxi-In Delay	min.		0.2
Departure	Flow Rate	a/c per hr.	31.0	37
Departure	Runway Delay	min.	9.7	16.0
Departure	Taxi-Out Delay	min.		0.3

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

JFK STAGE - 1 EXPERIMENTS

Experiment No. 8

Objective:

To obtain baseline capacity estimates, in IFR1 weather conditions, for the following runway-use configuration:

Arrival Runways	Departure Runways
13L	13R

Related Comparison Experiments:

Experiment No. 7 has the same basic runway-use configurations but is in VFR1 conditions.

Length and Level of Detail of Simulation Run:

From 1500 to 2300 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1900-2000 hours, and average values over the 8-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	26.1	26
Arrival	Air Delay	min.	83.4	111.5
Arrival	Taxi-In Delay	min.		0.1
Departure	Flow Rate	a/c per hr.	27.6	39
Departure	Runway Delay	min.	2.5	7.4
Departure	Taxi-Out Delay	min.		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1900-2000 hours, 5 hours into the simulation.

Attachment B

STAGE 1 AIRFIELD SIMULATION RESULTS

LaGuardia Airport

New York
Airport Improvement Task Force Delay Studies

Peat, Marwick, Mitchell & Co.
San Francisco, California

December 1978

Table B-1

NEW YORK TASK FORCE DELAY STUDIES
LaGuardia Airport
Summary Results of Stage-1 Experiments (Revised)
Airfield Simulation Model Runs

Experiment No.	Runways Used		Time Frame	Weather Conditions	Average Flow Rates-ac/hr				Average Runway Delays-min				Average Taxiing Delays-min		Major Comparison Cases
					Arrivals		Departures		Arrival Air		Departures		Taxi-In	Taxi-Out	
	Arrivals	Departures			Peak[a]	Average[b]	Peak	Average	Peak	Average	Peak	Average	Peak[a]	Peak[a]	
1	22	13	1977	VFR1	38	35.8	37	32.5	12.2	12.8	1.2	1.5	0.0	0.3	Baseline 1, 9, 2, 3
19	22	13	1977	VFR1	33	32.0	33	29.7	3.0	4.1	0.8	1.2	0.0	0.3	1
2	22	13	1977	IFR1	30	28.3	33	30.2	30.9	42.6	0.9	0.7	0.0	0.2	Baseline, 12
3	22	13	1977	IFR2	19	22.8	29	22.2	36.2	50.8	28.6	24.1	0.0	0.1	Baseline, 11, 20
11	22	13	1977	IFR2	30	28.2	26	24.0	19.9	25.6	8.3	18.2	0.0	0.2	3
20	22	13	1977	IFR2	32	31.3	32	28.7	2.5	3.4	0.8	1.1	0.0	0.3	3
4	4	31	1977	IFR2	27	25.5	11	14.7	28.5	32.3	49.2	58.1	4.2	5.1	Baseline
5	4	13	1977	VFR1	38	35.5	37	32.5	12.8	9.8	1.5	2.1	0.0	0.3	Baseline
6	13	13	1977	VFR1	39	35.8	27	27.0	12.3	13.3	13.9	28.8	0.1	0.4	Baseline, 7, 10, 10A
7	13	13	1977	IFR1	18	19.8	27	24.1	54.4	78.1	13.0	13.1	0.0	0.2	Baseline, 10, 10A
10	13	13	1977	IFR1											
10A	13	13	1977	IFR1	30	28.5	29	27.8	30.9	41.7	10.3	16.6	0.0	0.3	7
8	4	4	1977	IFR1	8	8.0	21	18.2	109.0	110.6	0.6	0.6	0.0	0.1	7, 10
9	13	4	1977	IFR1	29	28.3	30	29.2	30.9	42.7	5.0	5.8	0.0	0.2	Baseline, 13
					27	25.8	26	26.8	36.4	33.8	4.8	9.8	0.1	0.1	7

[a] For the peak-demand hour, 1700-1800 hours; three hours into the simulation.

[b] Average over the 6-hour simulation period.

LGA STAGE - 1 EXPERIMENTS

Experiment No. 1

Objective:

To provide baseline delay estimates, in VFR1 conditions, for the following runway-use configuration:

Arrival Runway	Departure Runways
22	13

Related Comparison Experiments:

Experiment 19 has same runway-use configuration and weather conditions but a different aircraft mix, to reflect impact of quota system alternatives.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1700-1800 hours, and average values over the 6-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	35.8	38
Arrival	Air Delay	min.	12.8	12.2
Arrival	Taxi-In Delay	min.		0.0
Departure	Flow Rate	a/c per hr.	32.5	37
Departure	Runway Delay	min.	1.5	1.2
Departure	Taxi-Out Delay	min.		0.3

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA STAGE - 1 EXPERIMENTS

Experiment No. 19

Objective:

To evaluate the impact in VFR1 conditions of case-specific observed (1977) aircraft mix that differs from the FAR-93 mix used in the baseline capacity experiments.

Related Comparison Experiments:

The impact will be evaluated by comparison with results of Experiment No. 1.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Anticipated Results:

Lower delays than in Experiment 1 due to assumed enforcement of quota.

Summary Comparison:

Operation Type	Performance Measure	Units	This Experiment		Experiment No. 1	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow Rate	a/c per hr.	32.0	33	35.8	38
Arrival	Air Delay	min.	4.1	3.0	12.8	12.2
Arrival	Taxi-In Delay	min.		0.0		0.0
Departure	Flow Rate	a/c per hr.	29.7	33	32.5	37
Departure	Runway Delay	min.	1.2	0.8	1.5	1.2
Departure	Taxi-Out Delay	min.		0.3		0.3

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA STAGE - 1 EXPERIMENTS

Experiment No. 2

Objective:

To obtain baseline delay estimates in IFR1 weather conditions, for the following runway-use configuration:

Arrival Runways	Departure Runways
22	13

Related Comparison Experiments:

Experiment No. 12 is for the same runway-use and weather, but it involves an improved taxiway network west of R4/22 and a partial parallel to Runway 4.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1700-1800 hours, and average values over the 6-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	28.3	30
Arrival	Air Delay	min.	42.6	30.9
Arrival	Taxi-In Delay	min.		0.0
Departure	Flow Rate	a/c per hr.	30.2	33
Departure	Runway Delay	min.	0.7	0.9
Departure	Taxi-Out Delay	min.		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA STAGE - 1 EXPERIMENTS

Experiment No. 3

Objective:

To obtain baseline delay estimates, in IFR2 weather conditions, for the following runway-use configurations:

Arrival Runways	Departure Runways
22	13

Related Comparison Experiments:

Experiments 11 and 20 have same conditions.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1700-1800 hours, and average values over the 6-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	22.8	19
Arrival	Air Delay	min.	50.8	36.2
Arrival	Taxi-In Delay	min.		0.0
Departure	Flow Rate	a/c per hr.	22.2	29
Departure	Runway Delay	min.	24.1	28.6
Departure	Taxi-Out Delay	min.		0.1

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA STAGE - 1 EXPERIMENTS

Experiment No. 11

Objective:

To evaluate effect of ASDE on delay estimates for IFR2 conditions.

Related Comparison Experiments:

Experiment 3 has the same conditions but with no ASDE-II improvement.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Anticipated Results:

Slightly increased flow rates and reduced delays compared with Experiment 3 due to ASDE-II.

Summary Comparison:

Operation Type	Performance Measure	Units	This Experiment		Experiment No. 3	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow Rate	a/c per hr.	28.2	30	22.8	19
Arrival	Air Delay	min.	25.6	19.9	50.8	36.2
Arrival	Taxi-In Delay	min.		0.0		0.0
Departure	Flow Rate	a/c per hr.	24.0	26	22.2	29
Departure	Runway Delay	min.	18.2	8.3	24.1	28.6
Departure	Taxi-Out Delay	min.		0.2		0.1

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA STAGE - 1 EXPERIMENTS

Experiment No. 20

Objective:

To evaluate effect of quota mix in IFR2 conditions -- see Experiment No. 19.

Related Comparison Experiments:

Experiment 3 is the baseline case; Experiment 19 is similar but in VFR1 conditions.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Anticipated Results:

Reduced delays compared with Experiment 3 due to assumed enforcement of quota.

Summary Comparison:

Operation Type	Performance Measure	Units	This Experiment		Experiment No. 3	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow Rate	a/c per hr.	31.3	32	22.8	19
Arrival	Air Delay	min.	3.4	2.5	50.8	36.2
Arrival	Taxi-In Delay	min.		0.0		0.0
Departure	Flow Rate	a/c per hr.	28.7	32	22.2	29
Departure	Runway Delay	min.	1.1	0.8	24.1	28.6
Departure	Taxi-Out Delay	min.		0.3		0.1

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA STAGE 1 EXPERIMENTS

Experiment No. 4

Objective:

To obtain baseline delay estimates, in IFR2 conditions, for the following runway-use configuration:

Arrival Runways	Departure Runways
4	31

Related Comparison Experiments:

None in Stage 1; possible Stage 2 experiment.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1700-1800 hours, and average values over the 6-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	25.5	27
Arrival	Air Delay	min.	32.3	28.5
Arrival	Taxi-In Delay	min.		4.2
Departure	Flow Rate	a/c per hr.	14.7	11
Departure	Runway Delay	min.	58.1	49.2
Departure	Taxi-Out Delay	min.		5.1

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA STAGE - 1 EXPERIMENTS

Experiment No. 5

Objective:

To obtain baseline delay estimates, in VFR1 conditions, for the following runway-use configuration:

Arrival Runways	Departure Runways
4	13

Related Comparison Experiments:

None directly in Stage 1; possible in Stage 2.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1700-1800 hours, and average values over the 6-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	35.5	38
Arrival	Air Delay	min.	9.8	12.8
Arrival	Taxi-In Delay	min.		0.0
Departure	Flow Rate	a/c per hr.	32.5	37
Departure	Runway Delay	min.	2.1	1.5
Departure	Taxi-Out Delay	min.		0.3

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA STAGE - 1 EXPERIMENTS

Experiment No. 6

Objective:

To obtain baseline delay estimates, in VFR1 conditions, for the following runway-use configurations:

Arrival Runways	Departure Runways
13	13

Related Comparison Experiments:

Experiments 7, 10, and 10A have the same runway-use, but they have different weather, namely IFR1, and improvements.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1700-1800 hours, and average values over the 6-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	35.8	39
Arrival	Air Delay	min.	13.3	12.3
Arrival	Taxi-In Delay	min.		0.1
Departure	Flow Rate	a/c per hr.	27.0	27
Departure	Runway Delay	min.	28.8	13.9
Departure	Taxi-Out Delay	min.		0.4

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA - STAGE 1

Experiment No. 7

Objective:

To obtain baseline delay estimates in IFR1 conditions for the following runway-use configuration and no interaction with TEB:

Arrivals	Departures
13	13

Related Comparison Experiments:

Experiments 10 and 10A have same runway use and weather, but they involve improvements.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1700-1800 hours, and average values over the 6-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	19.8	18
Arrival	Air Delay	min.	78.1	54.4
Arrival	Taxi-In Delay	min.		0.0
Departure	Flow Rate	a/c per hr.	24.1	27
Departure	Runway Delay	min.	13.1	13.0
Departure	Taxi-Out Delay	min.		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA - STAGE 1

Experiment No. 10

Objective:

To evaluate impact of relocating R13 glide slope antenna to reduce critical zone impact when there are mixed operations on R13.

Related Comparison Experiments

Experiment No. 7 serves as the comparison case for this experiment.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Anticipated Results:

Reduced delays and increased capacities, due to reduction of glide slope critical-zone impact on mixed operations, compared with Experiment 7.

Summary Comparison:

Operation Type	Performance Measure	Units	This Experiment		Experiment No. 1	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow Rate	a/c per hr.	28.5	30	19.8	18
Arrival	Air Delay	min.	41.7	30.9	78.1	54.4
Arrival	Taxi-In Delay	min.		0.0		0.0
Departure	Flow Rate	a/c per hr.	27.8	29	24.1	27
Departure	Runway Delay	min.	16.6	10.3	13.1	13.0
Departure	Taxi-Out Delay	min.		0.3		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA - STAGE 1

Experiment No. 10A

Objective:

To evaluate the impact of LGA-TEB interaction on delays experienced by mixed operations on R13 in IFR1 weather conditions.

Related Comparison Experiments:

Experiment No. 7 serves as the "No-other-improvement" comparison case for this experiment. Experiment No. 10 is the comparison case if one wants to examine the limits imposed on the delay reductions of Experiment 10 by the LGA-TEB interaction.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Anticipated Results:

Much greater delays due to interaction with TEB.

Summary Comparison:

Operation Type	Performance Measure	Units	This Experiment		Experiment No. 7	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow Rate	a/c per hr.	8.0	30	19.8	18
Arrival	Air Delay	min.	110.6	109.0	78.1	54.4
Arrival	Taxi-In Delay	min.		0.0		0.0
Departure	Flow Rate	a/c per hr.	18.2	21	24.1	27
Departure	Runway Delay	min.	0.6	0.6	13.1	13.0
Departure	Taxi-Out Delay	min.		0.1		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA - STAGE 1

Experiment No. 8

Objective:

To obtain baseline delay estimates, in IFR1 conditions, for the following runway use configuration:

Arrivals	Departures
R4	R4

Related Comparison Experiments:

Experiment No. 13 has same runway use and weather conditions as No. 8 but with an improved taxiway network for departures west of R4/22.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Results:

Below is a table that shows selected results for the peak-demand hour, 1700-1800 hours, and average values over the 6-hour simulation period.

Operation Type	Performance Measure	Units	This Experiment Average[a]	This Experiment Peak[b]
Arrival	Flow Rate	a/c per hr.	28.3	29
Arrival	Air Delay	min.	42.7	30.9
Arrival	Taxi-In Delay	min.		0.0
Departure	Flow Rate	a/c per hr.	29.2	30
Departure	Runway Delay	min.	5.8	5.0
Departure	Taxi-Out Delay	min.		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

LGA - STAGE 1

Experiment No. 9

Objective:

To evaluate the potential delay savings of improving airspace procedures so that the flow of arrivals to R13, in IFR1 weather conditions, is independent of the flow of departures on R4.

Related Comparison Experiments:

The potential benefits of these improved airspace procedures are obtained by comparison with Experiment No. 7, arrivals and departures on R13.

Length and Level of Detail of Simulation Run:

From 1500 to 2100 with 15-minute summaries.

Anticipated Results:

Lower delays and greater capacities than in Experiment 7.

Summary Comparison:

Operation Type	Performance Measure	Units	This Experiment		Experiment No. 7	
			Average[a]	Peak[b]	Average[a]	Peak[b]
Arrival	Flow Rate	a/c per hr.	25.8	27	19.8	18
Arrival	Air Delay	min.	33.8	36.4	78.1	54.4
Arrival	Taxi-In Delay	min.		0.1		0.0
Departure	Flow Rate	a/c per hr.	26.8	26	24.1	27
Departure	Runway Delay	min.	9.8	4.8	13.1	13.0
Departure	Taxi-Out Delay	min.		0.1		0.2

a. Average over the entire simulation period.
b. For the peak-demand hour, 1700-1800 hours, 3 hours into the simulation.

Attachment C

STAGE 2 EXPERIMENTAL DESIGN
(Preliminary)

New York Task Force

John F. Kennedy International Airport
and
LaGuardia Airport

Airport Improvement Task Force Delay Studies

Peat, Marwick, Mitchell & Co.
San Francisco, California

December 1978

Table C-1

NEW YORK TASK FORCE DELAY STUDIES
John F. Kennedy International Airport
Stage 2 Experimental Design
(Preliminary)

Stage 2 Experiment No.	Corres. Stage 1 Experiment No.	Model	Runways Used		Demand	Weather	ATC System	Airfield/ATC Improvements
			Arrivals	Departures				
26	1	ASM	13R,22L,22R	22R	1982	VFR1	1982	1982
27	2	ASM	22L	22R	1982	IFR1	1982	1982
28	7	ASM	13L,13R	13R	1982	VFR1	1982	1982
29	15	ASM	31L,31R	31L,31R	1982	IFR1	1982	1982
30	1	ASM	13R,22L,22R	22R	1987	VFR1	1987	1987
31	2	ASM	22L	22R	1987	IFR1	1987	1987
32	7	ASM	22L	22R	1987	VFR1	1987	1987
33	15	ASM	31L,13R	13R	1987	VFR1	1987	1987
9	9	ADM	n.a.	n.a.	1978	n.a.	Today's	None
10	10	ADM	n.a.	n.a.	1982	n.a.	1982	1982
11	11	ADM	n.a.	n.a.	1982	n.a.	1982	None
12	12	ADM	n.a.	n.a.	1982	n.a.	Today's	1982
13	13	ADM	n.a.	n.a.	1982	n.a.	Today's	None
22	--	ADM	n.a.	n.a.	1987	n.a.	1987	1987
23	--	ADM	n.a.	n.a.	1987	n.a.	1987	None
24	--	ADM	n.a.	n.a.	1987	n.a.	Today's	1987
25	--	ADM	n.a.	n.a.	1987	n.a.	Today's	None

Table C-2

NEW YORK TASK FORCE DELAY STUDIES
LaGuardia Airport
Stage 2 Experimental Design
(Preliminary)

Stage 2 Experiment No.	Corres. Stage 1 Experiment No.	Model	Runways Used		Demand	Weather	ATC System	Airfield/ATC Improvements
			Arrivals	Departures				
31	1	ASM	22	13	1982	VFR1	1982	1982
32	2	ASM	22	13	1982	IFR1	1982	1982
33	9	ASM	13	4	1978	VFR1	Today's	1978
34	9	ASM	13	4	1982	VFR1	1982	1982
35	9	ASM	13	4	1982	IFR1	1982	1982
36	11	ASM	22	13	1982	IFR2	1982	1982 & ASDE
37	1	ASM	22	13	1987	VFR1	1987	1987
38	2	ASM	22	13	1987	IFR1	1987	1987
39	9	ASM	13	4	1987	VFR1	1987	1987
40	9	ASM	13	4	1987	IFR1	1987	1987
41	11	ASM	22	13	1987	IFR2	1987	1987 & ASDE
14	14	ADM	n.a.	n.a.	1978	n.a.	Today's	None
15	15	ADM	n.a.	n.a.	1982	n.a.	1982	1982
16	16	ADM	n.a.	n.a.	1982	n.a.	1982	None
17	17	ADM	n.a.	n.a.	1982	n.a.	Today's	1982
18	18	ADM	n.a.	n.a.	1982	n.a.	Today's	None
27	--	ADM	n.a.	n.a.	1987	n.a.	1987	1987
28	--	ADM	n.a.	n.a.	1987	n.a.	1987	None
29	--	ADM	n.a.	n.a.	1987	n.a.	Today's	1987
30	--	ADM	n.a.	n.a.	1987	n.a.	Today's	None

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